Symons's

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"BRITISH RAINFALL, 1918."

"British Rainfall, 1918," the fifty-eighth annual volume of the series, by H. R. Mill and M. de Carle S. Salter, is now completely in type, and should shortly be ready for issue.

Although compiled entirely since the end of 1918 the new volume deals with the observations made during that year, and was prepared practically under the same conditions as its four predecessors which were published during the war. A severe restriction of space was therefore inevitable, but the size of the volume is slightly larger than that for 1917, and no break of continuity in the series of tables and maps has been necessary.

The Annual Report of the Directors to the Trustees, and a statement by Mr. Francis Druce, Treasurer to the Endowment Fund, give an account of the reasons which have led to the transfer of the responsibility for the future conduct of the British Rainfall Organization to the Government. The transfer was carried out on July 24th, 1919, and on the same date the resignation of Dr. H. R. Mill from the directorship, as stated in this Magazine for August, took place. Mr. Salter, who had acted as Assistant Director since 1913, and as Joint-Director with Dr. Mill since 1918, has been appointed Superintendent in charge of the work of the Organization. Dr. Mill contributes an article on the Development of the British Rainfall Organization since 1910, when it first ceased to be a purely private institution, bringing up to date his article in *British Rainfall, 1909*, which dealt with the first fifty years of its history. He outlines some of the possible future advances which it is hoped may be realized under the new conditions.

A full abstract of Mr. Salter's recent paper on the Relation of Rainfall to Configuration is also given, setting out some generalizations resulting from the cartographical treatment of rainfall data by Dr. Mill during the last nineteen years.

The statistical basis for the study of the rainfall of 1918 consisted of 4998 records, or 87 fewer than were available for 1917. The diminution in the number of stations has, however, been set off

by an improvement in distribution. The number of records of rainfall duration published continues to increase, and complete monthly tables of this element are given for 61 stations.

The year was characterized by an unusual absence of heavy daily rainfalls, but detailed accounts are given of several violent and extremely local thunderstorms during the summer.

The volume is fully illustrated, including a portrait of Dr. H. R. Mill, and the usual coloured map showing the relation of the year's rainfall to the average, this being the thirteenth map of the kind published in successive years.

WIRELESS METEOROLOGICAL INFORMATION TO AND FROM SHIPS AT SEA.

By Lieut. H. G. Grant, R.N.,
Superintendent, Meteorological Department of the Admiralty.

The *London Gazette* of 15th August last, contains over the signature of the Hydrographer of the Navy an Admiralty Notice to Mariners (No. 1393 of 1919) in regard to wireless meteorological information to and from ships at sea. There is no change whatever in the general arrangements for collection, transmission, and issue of information outlined in the previous Notice (No. 880 of 1919), published in *The Times* on May 6th (see this Magazine, May, 1919, p. 37), which is superseded by the present Notice. There are, however, several material changes in the schedule of wireless stations.

The note previously appearing in regard to the British stations at Poldhu and Cleethorpes to the effect that these stations "would be started shortly" is now deleted, and the stations are given as working. The station at Washington now issues bulletins at two fixed hours of the day instead of only one. New weather-reporting stations are notified as established at Annapolis, U.S.A., and for the Mediterranean at Rinella.

The Notice contains the information that negotiations are in hand to extend and unify the system of collecting weather data by wireless from ships at sea all over the world, and at the same time to organize the free transmission of weather bulletins from a sufficient number of wireless stations to admit of ships being constantly supplied with reliable weather reports and forecasts wherever they may be.

The Notice further adds :—"It should be borne in mind that the needs of ships at sea in regard to information regarding the weather will march hand in hand with the requirements of aircraft. The importance of this service will, therefore, be constantly increasing, and its success or failure will largely depend upon the co-operation of ships at sea in providing the data without which accurate fore-

casting is impossible. The matter does not depend solely upon the efforts of the ships selected to furnish the data. The essence of success lies in rapidity in passing such data by wireless from the ship to the coast station, and thence to the central meteorological office. It follows, therefore, that all ships not taking an active part in supplying data should use the greatest care not to interfere with the transmission of the wireless messages to the shore.

"Earnest endeavours are being made to obtain international agreement as to the form of these weather bulletins and to the methods and times of transmission. It is hoped that the messages will eventually all be made in an international code at fixed times, so arranged that a ship with only one wireless operator will be able to read them. A similar scheme for time signals is being evolved."

The Naval Meteorological Service under the Hydrographic Department of the Admiralty issue the following Wireless Weather Bulletins, giving in plain language forecasts for specified areas for the information of ships at sea, namely :—

1. *Western and South-Western Seaboard of the British Isles :*— Embracing the Western and South-Western Seaboard of the British Isles, and including the Bristol Channel and Mouth of the English Channel ; also, when possible, the Bay of Biscay.

This Weather Bulletin is identified by the prefix, "Western."

(*a.*) Wireless Telegraph Weather Bulletin, giving forecast for the following 12 hours, issued to "All Ships" from Poldhu, at 0930 G.M.T. (9.30 a.m.), on 2,700 metres wave, based on observations taken at 0700 G.M.T. (7 a.m.).

(*b.*) Wireless Telegraph Weather Bulletin, giving forecast for the following 12 hours, issued to "All Ships" from Poldhu, at 2130 G.M.T. (9.30 p..m) on 2,700 metres wave, based on observations taken at 1800 G.M.T. (6 p.m.)

2. *North Sea, Eastern and South-Eastern Seaboard of British Isles :*—Embracing entire North Sea and also English Channel.

This Weather Bulletin is identified by the prefix "Eastern."

(*a.*) Wireless Telegraph Weather Bulletin, giving forecast for the following 12 hours, issued to "All Ships," from Cleethorpes, at 0500 G.M.T. (5 a.m.) on 3000 metres wave, based on observations taken at 0100 G.M.T. (1 a.m.).

(*b.*) Wireless Telegraph Weather Bulletin, giving forecast for the following 12 hours, issued to "All Ships," from Cleethorpes, at 1700 G.M.T. (5 p.m.) on 3,000 metres wave, based on observations taken at 1300 G.M.T. (1 p.m.).

By arrangement with the Admiralty these Bulletins are also published daily in the weather columns of *The Times.*

It is interesting to observe that somewhat similar messages which give both data for selected stations and forecasts in non-technical language for specified areas are prepared by the Weather Bureau of the United States and circulated from Arlington.

BRITISH ASSOCIATION AT BOURNEMOUTH.

At the Conference of Delegates of Scientific Societies, Lord Montague of Beaulieu, President, in the chair, Mr. M. de Carle S. Salter, Superintendent of the British Rainfall Organization, read a paper entitled, "The Exposure of Rain Gauges, "of which the following is a brief abstract :—

As the result of several series of experiments conducted under the direction of the late Mr. G. J. Symons the adoption of the Standard rain gauge, exposed at one foot above ground, has become general in this country. The diminution of catch in rain gauges exposed at greater heights above ground was long thought to be due to a variation in the fall at different elevations, but is now recognized as being caused by wind eddies preventing the rain from entering the funnel. Gauges sufficiently sheltered yield substantially indentical results at all elevations above ground. Far too little attention has been given to the provision of proper shelter from strong wind in placing rain gauges. In inland and naturally sheltered localities this precaution may usually be neglected with impunity, but in positions near the sea or at considerable altitudes, shelter, especially on the side of the prevailing wind, is necessary. In such positions the loss caused by elevating the gauge more than one foot above the ground is greater proportionally to the degree of exposure. It is greatly aggravated in the case of snow and still more so should the gauge be of the obsolete shallow-funnel type. Rain gauges should on no account be placed on sites where the land slopes downwards on the side of the prevailing wind, or near the top of a cliff or terrace. As a general rule the loss of catch in faultily exposed gauges occurs principally in the winter months, and, save in exceptional cases the loss in the summer half year may be safely ignored.

Whilst avoiding over exposure it is equally important to place a rain gauge so that no part of the rain shall be intercepted by objects too near the gauge, more particularly by trees or growing plants.

The existence of errors in rainfall records due to faulty exposure, is usually made apparent by the want of harmony with values at neighbouring stations observed when plotting rainfall maps. A large number of instances of want of harmony have been specially investigated, the gauges in nearly every case proving to be defective, either in construction or exposure. The degree of disparity which may be taken to indicate error decreases largely with the length of period dealt with, inconsistencies of 25 per cent. in a month's rainfall, not explained by the configuration, being sometimes due to variations in the actual fall, whilst in mapping the rainfall of a year, or the average of a series of years, a variation of 5 per cent. would probably indicate error.

On Thursday, September 11th, at Linden Hall, Bournemouth, a meteorological luncheon was held, Sir Napier Shaw in the chair. We hope to give an account of this in our next issue.

FLOOD WARNINGS IN NEW ZEALAND.

THE problem of flood prevention in New Zealand is dealt with in a recent report by the Dominion Meteorologist, Lt.-Col. D. C. Bates, to whom we are indebted for the following notes. The interference of civilization with natural conditions is not usually in the direction of lessening flood damage, clearing and drainage, causing the water to run off quickly, thus increasing the scouring of slopes and deposition of silt in the lower reaches. The effect is to raise the general level of the lower beds and aggravate flooding. The problem of prevention is one which appears only to be soluble as a national task, the reconciliation of conflicting interests being too difficult to achieve on any other lines and the report recommends strongly the organization of both prevention and warnings on a proper basis.

Attention is directed to the abnormal flooding which not infrequently occurs when the winter snows melt, these being entirely disproportionate to the actual amount of precipitation. Apart from snow the run-off is stated to be approximately 25 per cent. of the precipitation, a figure which we imagine must be applied only with a very generous margin of uncertainty. Experience in the British Isles shows us that the expression of the run-off as a percentage of the amount of precipitation is misleading, since quite apart from the very great variability at different seasons and under different conditions of soil and weather, recognized by Mr. Bates, it is practically certain that a much larger proportion of run-off occurs when the average rainfall is large than when it is small.

The prediction of floods may be attempted on (i.) the weather chart; (ii.) the records of rainfall in the river basins, and (iii.) the actual rise of the streams in their upper reaches. Owing to the known uncertainty, especially in respect to locality, in forecasting heavy rain, the first mentioned method is only applicable in a general manner. The second source of information is undoubtedly capable of development by provision of more observing stations and improving means of communicating records, but the actual rising of the river affords the most certain and striking means of forecast, not only for the time but for the height of an inundation.

The report recommends the closer observation of rainfall, the establishment of flood gauges, and the formation of a Committee of Safety or Rivers Board charged with the organization and administration of flood warnings in consultation with the Dominion Meteorological Service, the Public Works and Railway Departments.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

EARLY SNOW.

On the morning of September 20th, we had a fall of snow, almost a covering. The earliest I have hitherto recorded snow at Sunderland, since 1857, inclusive, was October 4th, which was in 1867. Since the 20th there have been some warm days, the thermometer reaching 67° on the 25th. T. W BACKHOUSE.

West Hendon House, Sunderland, September 27th, 1919.

On looking out at 8 a.m. (Summer Time), September 20th, I could scarcely believe my eyes on seeing the Black Mountains glistening with snow under a brilliant sun. On the previous day I had expected to hear of the first snow on the Scottish mountains with the cold north-westerly type of weather then prevalent, but I was not prepared to see snow actually lying in Herefordshire. The snow-level was about 1,300 feet; it had all gone by 11 a.m. (though probably not on the northern slopes, invisible from here). The Clee Hills round Ludlow, had a covering of two to three inches, and the Ludlow hounds meeting at the foot of the hills had to be stopped in a run and taken off to the lower ground owing to the snow balling in the horses' feet; the snow lasted here till about mid-day. In the early morning there was a slight trace lying right down in the Teme Valley, not 300 feet above sea-level. We had a September snow last year, on the 29th, which I never expected to see equalled, much less eclipsed by nine days, and that within a year. On that occasion the cold was caused by the passage of a depression to our south and Sunday, September 29th, 1918, had a maximum temperature of only 45°, with a bitter rain from east and north-east. After 3 p.m. (G.M.T.) temperature was 40° or below, and above 800 feet snow was mingled with the rain. The Black Mountains were covered quite six inches deep, and remained pure white for twenty-four hours above 2,300 feet, while drifts remained for a week. There was no further snow lying on them till within a week of Christmas! September, 1919, closed with severe frost, the exposed thermometer 4 feet above ground on the morning of the 29th, registering a minimum of 21°, the lowest September reading recorded in 33 years' observations. Walnuts were frozen on the trees and completely destroyed, being subsequently turned into a dry, black, crinkled pulp.

Kentchurch Rectory, Hereford, September 30th, 1919. R. P. DANSEY.

A RECORD RAINFALL FOR GUERNSEY, 1894-1919.

THE depression of September 2nd and 3rd gave the biggest rainfall at this station in the twenty-six years, 1894-1919.

Rain set in with a south wind at 2 p.m., on September 2nd, and after falling spasmodically during the afternoon and evening (·67 in. fell in the first three hours) the wind veered to north, and a steady downpour followed. At 9 a.m. on the 3rd, the total for the seventeen hours was just 2·50 in.; or ·08 in. in excess of my previous heaviest daily fall, viz., 2·42 in., on October 2nd, 1904.

In the twenty-six years 2 inches of rain as a daily fall has been recorded four times only at this Channel Island station.

As regards this week's rainfall, the heaviest rain fell undoubtedly with the north wind and ceased gradually and ultimately altogether with a backing of the wind to north-west and west.

"*Les Blanches,*" *Guernsey, September 5th, 1919.* BASIL T. ROWSWELL.

THE CLIMATE OF MESOPOTAMIA.

THE following extracts from letters from a friend in Mesopotamia may be of interest to readers of this Magazine.

From Corpl. R. J. Smith, R.E., April 6th, 1918 :—

> "... I will now give you a little idea of the meteorological conditions out here. There is an enormous difference between summer and winter temperatures. We have been experiencing a very cold and wet winter, after having had no rain for nearly nine months. The hot weather is late in starting this year, but it will not be many days now before we need topees and spine-pads. Our coldest day this winter was in last December, when 14° of frost were registered, and the hottest last summer was 124°·8 in shade. In tents it goes up to at least 135°. The buttons on one's tunic get too hot to touch the same with one's rifle and all metal objects. The glare is terrible, and one needs dark blue glasses; further protection from the sun is given by spine-pads, and helmet shades (a flap which comes over the nape of the neck) ... In the winter we feel the cold tremendously, especially as we have to live in tents (more or less rain-proof), and have no fires, not even a charcoal brazier. This [Mesopotamia] is a healthy climate in the winter, better than India, I think ...."

From Corpl. R. J. Smith, R.E., July 31st, 1918 :—

> "The highest shade temperature ever officially recorded in Baghdad is 124°·8 F., in July, 1917, and the coldest, 18°·6 F., a few years ago. Last winter, at Baqubah, we often had 12° of frost. As regards rainfall (in Mesopotamia) none has ever been known during the months June to September, and the total per year is 6·89 in., which falls on an average of sixteen rain-days. In the winter the rain is like what one experiences in England, accompanied by very high winds and dust storms, when the rain ceases, which is very uncomfortable during camp life, as the dust penetrates everywhere. The mean daily maximum shade temperature for this month (July), is 109°·2, and minimum ditto 79°·7 .... August is the worst month, so have plenty of hot weather to come. I am writing this in a temperature of 112° F.

Tower Park, Moretonhampstead. D. W. HORNER, F.R.Met.Soc.

DEATH BY LIGHTNING—AN UNUSUAL PHENOMENON.

On Sunday, the 14th September, 1919, about 7.40 p.m., I was called to see a man who was struck down by lightning at Finsbury Park, London, N. He was accompanied by his wife and his wife's sister. At the inquest his wife stated that with a particularly vivid flash she was thrown down and rendered unconscious for a short time. When she recovered she found her husband standing erect with his coat on fire, and she tried to extinguish the flames. With the next peal of thunder he expired. A man who was running to his assistance told me he saw the man falling backwards against the iron fencing near. There were rows of elm trees at the spot where he was at the time.

The coat was severely burnt from the collar down to the bottom, nearly completely severing the coat in two. The back of the waistcoat was likewise badly burnt, and his shirt less so. The edges of the braces were burnt at one place on each; trousers at upper part of back slightly. The hair of the back of the head was singed. There was a burn on the back of the neck. The space between the middle of both scapulæ was extensively burnt to the first degree, the mid-dorsal region slightly, but on both sides severely. At the right lower lumbar region was the largest burn. At various spots there were slight points of burns (punctures). Generally speaking the burns on the *right* side of the back were all worse than those on the left. He was evidently struck from the right side of his back.

From the right shoulder and across the chest and down to the lower of the front of the abdomen impressions of branches and leaves were clearly imprinted on the skin, showing like an X-ray plate how certain rays of light were impeded by the branches and foliage, whilst others made the contour of these. There were two distinct branches with leaves, one occupying the space between the right iliac crest to near the ensiform cartilage and the other proceeding down on the left side from the stomach to the left iliac crest. To my mind it would appear as if these were implanted while the man was falling back with a flash coming over the right shoulder.

A. G. NEWELL, M.D., D.P.H.

Harringay, N. 8, September 21st, 1919.

[The production of a pattern resembling foliage is very curious, and at first sight, considering the great length of the source of light, it seems impossible to suppose the pattern to have been formed as a shadow. It may be, however, that the particular flash was approaching the tree in such a way that the man would have seen it end-on, and in that position sharp shadows would have been formed.—Ed., *S.M.M.*]

WIND IN RELATION TO TIDE.

It would be interesting to know the opinions and experiences of your readers as regards the change in direction or force of the wind in relation to the change of tide. It is common to find that among fishermen the belief is held that the tide has a distinct influence on the wind, and although the theory is usually discredited among meteorologists, it is certainly upheld to a great extent by my own modest experiences on this coast. Of course, there are many occasions when there is nothing in common between wind and tide, and perhaps the other occasions are mere coincidences, although they seem to occur too often to be classed as such. The change of the time of the turn of the tide from day to day naturally increases the possibility of a change in the force or direction of the wind coinciding with it. In the Bristol Channel, the tides of course run with great strength, and it is necessary to be on the sea to observe the influence on the wind. I am frequently out fishing at all times of the year and in conversation with the local fishermen, so have had fair opportunities of studying the subject.

The general direction of this coast runs E. to W., and so faces at right-angles to the flow of tide in the Channel, and there is a tendency for winds to group themselves round E. and W. With easterly winds, if there is some strength in them, there is a tendency to freshen as soon as the ebb-tide sets down, and to become lighter when the flood makes up, or as they say here, "the flood runs the wind off." When there are only light easterly winds they usually die away in the afternoon, "the sun eats the wind up," to quote a local saying again, or back N.W. at the change of tide, either ebb or flood. A very common wind here is W.N.W. to N.W. during the summer, in fact, it is on an average the most prevalent wind during that season. It gradually freshens to a fresh or strong breeze, until late afternoon, when it begins to fall off, and is known locally as a "sun-breeze," and is, in fact, a typical sea-breeze. The tide does not seem to make much difference in its strength, except that it usually freshens somewhat on the ebb. Another rather similar wind frequently occurs, when the true wind is S.W. and light in force, but on these occasions it is more northerly, and causes fog to form on the headlands. This wind nearly always seems to coincide with a change of tide, whether ebb or flood seems immaterial. All the above may be taken as occurring in "fine" weather, but when depressions are passing the effect of the tide is, as a rule, not so marked, of course, as there is a more general flow of air. However, I have frequently experienced sudden shifts of wind from S.W. to N.W. during bad weather, when the tide begins to flow. These squalls are sometimes very fierce, but usually fall off in strength after some time.

These are a few cases where very often there really does seem to be relationship between the tide and wind. It is, however, a complex subject, and doubtless varies on different parts of the coast.

Minehead, Somerset, September 15th, 1919. T. F. TWIST.

METEOROLOGICAL NEWS AND NOTES.

METEOROLOGICAL OFFICE APPOINTMENTS. The following appointments on the staff of the Meteorological Office have been notified. MR. R. G. K. LEMPFERT, M.A., C.B.E., late Superintendent of the Forecast Division, to be Assistant Director for general oversight of Observatories and Stations contributing observations to the Office as from September 1st, 1919. LT.-COL. E. GOLD, D.S.O., F.R.S., lately in command of the Overseas Contingent of the Meteorological Section of the Royal Engineers, to be Assistant Director in charge of Forecasting, as from September 1st, 1919. CAPT. D. BRUNT, M.A., to be Superintendent of Meteorological work for Army Services.

SIR RICHARD GLAZEBROOK, C.B., F.R.S., retired from the directorship of the National Physical Laboratory on September 18th, after twenty years' service, during which time the work and scope of the laboratory have been developed in an extraordinary manner. Professor J. E. Petavel, D.Sc., F.R.S., of Manchester University has been appointed as the new Director.

MEETINGS AT THE METEOROLOGICAL OFFICE for the discussion of contributions to current meteorology in Colonial and Foreign Journals will be resumed in November. The days arranged are Mondays, November 3rd and 17th, December 1st and 15th, 1919, and January 5th and 19th, February 2nd and 16th and March 1st, 15th and 22nd, 1920. The Director will be glad if Observers and others interested in Meteorology will favour him with their presence and take part in the discussions.

THE BRITISH DOMINIONS Meteorological delegates in the course of the recent Conference in London visited the headquarters of the British Rainfall Organization at 62, Camden Square, on September 26th. An exhibit of rainfall maps showing all branches of cartographical research on the distribution of rainfall was arranged.

FROSTS occurred on five days in September at Bristol where the shade temperature range for the month was 56°·3. At Camden Square the shade minimum on the 29th was 32°·2 being 0°·8 lower than the previous lowest temperature in September during 62 years.

SOUTH TEXAS experienced a tropical storm of unusual violence on September 14th. A Reuter New York message gives the fatalities in Corpus Christi and neighbouring localities at 120 and estimates the damage to property at about £2,000,000, while the Central News Washington correspondent says that approximately 30,000 people are homeless.

NOTES ON THE CLIMATE OF MESOPOTAMIA.

By C. H. E. Ridpath.

(*Continued from page* 91.)

During the summer dust-devils may be seen every day. Their diameter at the base is anything up to fifty yards. They travel with the wind and possess plenty of energy and lifting power. They extend many hundred feet into the air. A pilot in our squadron happened once to fly over the top of a dust devil. He was not lifted but fell 1,000 feet so quickly that the machine barely stood the strain when it suddenly encountered denser air again.

Dust storms, of course, take place on a much larger scale. It is noticeable sometimes how a cool wind will suddenly replace a hot wind in the opposite direction. During such a storm the dust particles will charge up wireless aerials to such an extent that the aerial, which, of course, is insulated from earth, will at times yield a spark, over a half-inch gap to earth, of a high enough frequency to cause a musical note. Such storms stop all wireless communication, but in any case atmospherics are bad the whole summer.

During the hot days if one is not lucky enough to have ice, porous pots or "chatties" give cool water. I often found 20° difference between air temperature and that of water in these vessels. They are a happy hunting ground, however, for mosquito larvæ. Water left out all day in non-porous vessels becomes scalding.

The adaptability of the human system is wonderfully exemplified when one considers that it can retain a temperature not far from the normal 98°·6 in an atmosphere of 120° and over. If perspiration stops there is immediate danger of heat stroke. It must be remembered that although a Stevenson screen may only register, say 120°, temperatures in tents may reach 125° and 130°; I have heard of higher figures, but doubt their accuracy.

In winter the prevailing winds are north-west and also points between south-east and south-west. The former wind brings fine weather, sometimes with very cold nights, but the latter brings thunderstorms and wet weather. Atmospherics are almost totally absent with the former wind, but reappear directly a change to the south takes place. I can best describe the winter by saying one provides oneself with clothing similar to that for an English winter. In December, 1917, a minimum of 16° was recorded at Samarra on the Tigris, eighty miles north of Baghdad. It is really an excellent climate in winter.

Rain is made to appear worse than it is owing to the fact that the soil is entirely composed of alluvial mud, one does not see much sand. This mud is, of course, baked hard in summer, except where there is traffic, when it turns into several inches of very fine light dust providing a good nucleus for dust devils and other abominations. A few hours' rain creates mud of a very tenacious quality sufficient to stop all motor traffic. Operations in winter were some-

times seriously handicapped by the weather, for at times communications from railhead were 150 miles long.

Thunderstorms of a fairly violent character take place the whole winter, but present no unusual features. On the average, winds do not attain abnormal force. In judging the elements when one is under canvas, great care has to be taken not to over-estimate. When a tent that contains all one's worldly possessions, is making a noise like stage thunder and exuding water at every pore at 2 a.m. with every sign of imminent collapse, one may be forgiven a little exaggeration !

I was once afforded an excellent example of the relation between atmospheric electricity and rainfall. I happened to be experimenting in a receiving station at the base of an eighty foot wireless mast near Hit, on the Euphrates. Quite suddenly, through the telephones, I heard the aerial start to charge up at a very rapid rate accompanied by the usual hissing sounds of brush discharges ; in a few seconds very heavy rain indeed started. The storm lasted three or four minutes, but was so intense that one could only see a few yards away. I would not like to estimate the rain that fell in those four minutes, but I do know that destructive torrents appeared like magic and rushed through the camps doing a lot of damage. This storm did not start gradually but at once. Would it not be possible that the charging up of the aerial was due to a large volume of air being driven down under the first rush of the rain? Coming from a height this air would be at a higher potential than that of earth. This rain was unaccompanied by thunder, lightning or wind. At other times I have noticed similar but less intense phenomena. As soon as the rain starts the charging up of the aerial ceases, the aerial insulation from earth is of course, unimpaired by rain.

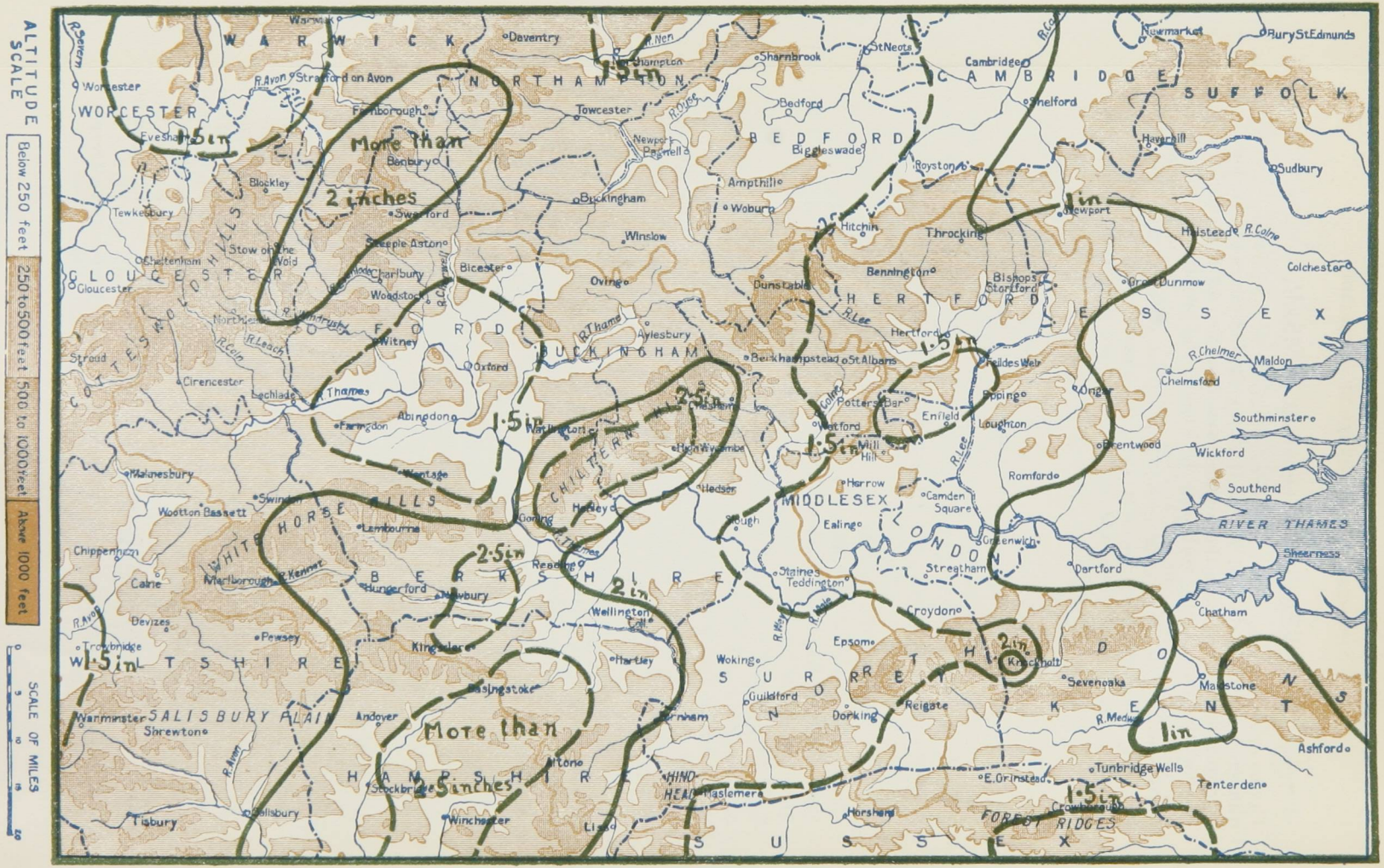
In spite of several storms and the fact that our eighty foot iron masts were the tallest of neighbouring objects, we never had one struck. This fact confirms the view that the function of a lightning conductor is to "tap off" high potential atmosphere at an altitude and relieve a tension that otherwise might bring about an actual discharge.

The Turks have had this country of wonderful possibilities for close on five hundred years and have done everything retrogressive : yet the land cries out for cultivation. After the first rains of autumn, barren desert yields grass, which in places becomes luxuriant by the next spring, only to wither and disappear once more with the return of the heat. Remains of great canals built by the ancients can still be seen and speculation is interesting on the amount of cultivation and its effect on the climate in those far-off days.

Mesopotamia was once a land of greatness and abundance ; under Turkey the land was barren ; under a wise and enterprising administration there are, indeed, great possibilities.

Erratum.—In the first part of this article the date 1918 should read 1917. and 1919 should read 1918.—C. H. E. Ridpath.

THAMES VALLEY RAINFALL SEPTEMBER 1919



WEATHER OF SEPTEMBER.

THE month was distinguished by great fluctuations in temperature, some daily readings being unusually high for the time of year, and others equally low.

During the opening days the weather was influenced by a cyclonic system, which skirted our Atlantic seaboard, the winds being mainly from S. or S.W., with mild changeable conditions, and heavy rain on the 1st, in many western and northern districts. As the disturbance passed away the wind drew into W., and over a large portion of England the type of weather became anticyclonic. With an abundance of bright sunshine the thermometer rose steadily to a high level, the maximum shade readings on the 11th being above 85° at many English stations. At Raunds (Northants) the thermometer reached 90°, and in most parts of the country the day was hotter than any in the three summer months, June to August. On the 12th, when a new anticyclone spread in from the Atlantic, the wind shifted to N. and N.E., and a rapid fall of temperature occurred. In many places the change in twenty-four hours amounted to at least 20°, and at Nottingham to 28°, the shade maxima on the 11th and 12th being respectively 85° and 57°. Sharp frost occurred in Scotland on the nights of the 13th and 14th, the sheltered thermometer falling to a minimum of 27° at Balmoral and West Linton.

With the continued extension of the Atlantic high-pressure system, the polar current gradually died away, and on the 17th and 18th, the thermometer exceeded 70° in many of the English districts. A well marked depression (secondary to a larger disturbance over Scandinavia) skirted the north of Scotland on the 18th, and in its rear a fresh N. wind sprang up over the whole of the United Kingdom. Another rapid fall of temperature consequently took place, the maximum readings on the 19th and 20th being below 55° in most places, and below 50° at many northern stations. Sharp ground frosts occurred on the night of the 19th, the exposed thermometer sinking to 17° at Rounton (N. Yorks) and to 22° at Crathes, Durham, Worksop and Wisley. Snow fell about this time over a large portion of North Britain, and sleet or hail in many southern districts. During a spell of westerly winds, which prevailed between the 24th and 27th, the air again became much milder, and on the 25th most places experienced a shade maximum temperature well above 65°. A subsequent veering of the wind to the N.W. brought about a fresh reduction in temperature, and on the three nights, 27th to 29th, sharp frost was general. On the surface of the grass the minimum readings about this time were as low as 15° at Rhayader, 17° at West Linton, and 19° at Greenwich and Richmond.

Thunderstorms occurred locally over the southern half of England on the 6th and again on the 13th or 14th, and in the north of England and the south of Scotland on the 11th or 12th. Bright sunshine was fairly abundant.

The rainfall of the month was light over the southern and central areas of Great Britain, but increased towards the north, and in the Western Highlands was in excess of the average. It varied little from the average over Ireland. Less than an inch fell over the Thames Estuary, parts of East Anglia and the south-east coast, and less than 2 inches along nearly the whole of the east coast and in scattered areas in the south and Midlands. In the Pennines, the Welsh mountains, and over the greater part of the west of Scotland, the fall reached 5 inches. It exceeded 10 inches in Merionethshire, the English Lake District and over a considerable part of Inverness-shire. Between 2 and 4 inches fell over nearly the whole of Ireland, but more than 6 inches was recorded in elevated areas in the west and north. Nearly 10 inches fell in the mountains of Connemara. The general rainfall expressed as a percentage of the average, was :—England and Wales, 78; Scotland, 112; Ireland, 97; British Isles, 94.

In London (Camden Square) fine, warm weather prevailed in the early part. Shade temperature exceeded 70° on each of the first 13 days, and exceeded 80° on 4 days. A period of showery and cool weather followed, and on the 29th the shade minimum fell to 32°·2. Duration of rain, 14·4 hours. Evaporation, 1·53 inches.

RAINFALL TABLE FOR SEPTEMBER, 1919.

STATION.	COUNTY.	RAINFALL. Aver. 1875–1909. in.	1919. in.	Diff. from Av. in.	Per cent. of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days
Camden Square	*London*	2·00	1·29	— ·71	64	·51	14	10
Tenterden	*Kent*	2·25	1·35	— ·90	60	·53	22	8
Arundel (Patching)	*Sussex*	2·58	1·55	—1·03	60	·68	22	7
Fordingbridge (Oaklands)	*Hampshire*	2·39	1·61	— ·78	67	·80	2	12
Oxford (Magdalen College)	*Oxfordshire*	1·98	1·23	— ·75	62	·35	2	12
Wellingborough	*Northampn*	2·13	1·44	— ·69	68	·66	6	9
Bury St. Edmunds (Westley)	*Suffolk*	2·18	·59	—1·59	27	·20	22	9
Geldeston [Beccles]	*Norfolk*	2·13	·54	—1·59	25	·16	19	6
Polapit Tamar [Launceston]	*Devon*	3·11	1·82	—1·29	59	·39	19	13
Rousdon [Lyme Regis]	,,	2·69	1·54	—1·15	57	·42	4	11
Ross (Birchlea)	*Herefordshr.*	2·39	1·42	— ·97	59	·37	2	15
Church Stretton	*Shropshire*	2·40	2·40	·00	100	·89	12	9
Boston	*Lincoln*	2·07	1·52	— ·55	73	·96	5	10
Worksop (Hodsock Priory)	*Nottingham*	1·84	1·86	+ ·02	101	·69	13	14
Mickleover Manor	*Derbyshire*	2·11	1·78	— ·33	84	·58	22	13
Congleton (Buglawton Vic.)	*Cheshire*	2·67	2·68	+ ·01	100	·64	22	18
Southport (Hesketh Park)	*Lancashire*	3·09	2·35	— ·74	76	·64	1	17
Wetherby (Ribston Hall)	*York, W.R.*	2·11	1·02	—1·09	48	·30	1	6
Hull (Pearson Park)	,, *E.R.*	2·05	1·40	— ·65	68	·47	13	13
Newcastle (Town Moor)	*North'land*	2·00	1·05	— ·95	52	·33	1	11
Borrowdale (Seathwaite)	*Cumberland*	11·28	14·65	+3·37	130	...	...	...
Cardiff (Ely)	*Glamorgan*	3·61	2·64	— ·97	73	1·20	22	17
Haverfordwest	*Pembroke*	3·91	2·38	—1·53	61	·48	22	17
Aberystwyth (Gogerddan)	*Cardigan*	3·89	3·63	— ·26	91	1·06	22	16
Llandudno	*Carnarvon*	2·50	1·91	— ·59	76	·56	22	17
Cargen [Dumfries]	*Kirkcudbrt.*	3·34	3·60	+ ·26	108	·75	29	19
Marchmont House	*Berwick*	2·67	1·53	—1·14	57	·41	12	14
Girvan (Pinmore)	*Ayr*	4·30	4·61	+ ·31	107	·78	12	18
Glasgow (Queen's Park)	*Renfrew*	2·99	2·42	— ·57	81	·46	4	18
Islay (Eallabus)	*Argyll*	4·49	5·00	+ ·51	111	·84	25	25
Mull (Quinish)	,,	5·20	7·50	+2·30	144	·91	21	25
Loch Dhu	*Perth*	6·22	6·90	+ ·68	111	1·10	25	19
Dundee (Eastern Necropolis)	*Forfar*	2·34	1·18	—1·16	77	·31	1	15
Braemar	*Aberdeen*	2·73	2·73	·00	100	·57	19	17
Aberdeen (Cranford)	,,	2·69	2·61	— ·08	97	·66	19	14
Gordon Castle	*Moray*	2·58	3·27	+ ·69	127	...	...	...
Drumnadrochit	*Inverness*	2·94	2·58	— ·36	88	·93	22	21
Fort William	,,	6·66	7·90	+1·24	119	1·60	25	25
Loch Torridon (Bendamph)	*Ross*	7·28	11·20	+3·92	154	2·22	25	23
Dunrobin Castle	*Sutherland*	2·51	2·85	+ ·34	114	·53	22	16
Glanmire (Lota Lodge)	*Cork*	3·20	2·01	—1·19	63	·40	30	14
Killarney (District Asylum)	*Kerry*	3·79	3·13	— ·66	83	1·19	30	19
Waterford (Brook Lodge)	*Waterford*	3·19	2·14	—1·05	67	·70	30	10
Nenagh (Castle Lough)	*Tipperary*	3·16	3·27	+ ·11	104	·88	22	19
Ennistymon House	*Clare*	4·22	5·75	+1·53	136	1·05	22	20
Gorey (Courtown House)	*Wexford*	2·78	2·68	— ·10	96	·76	3	14
Abbey Leix (Blandsfort)	*Queen's Co.*	2·93	2·22	— ·71	76	·82	22	14
Dublin (Fitz William Square)	*Dublin*	2·06	2·00	— ·06	97	·47	22	16
Mullingar (Belvedere)	*Westmeath*	3·02	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	4·42	4·45	+ ·03	101	·84	3	21
Cong (The Glebe)	,,	4·05	...	...	...	...	...	...
Collooney (Markree Obsy.)	*Sligo*	3·65	3·95	+ ·30	108	·62	3	21
Seaforde	*Down*	3·25	2·92	— ·33	90	1·16	4	19
Ballymena (Harryville)	*Antrim*	3·43	3·44	+ ·01	100	·35	30	19
Omagh (Edenfel)	*Tyrone*	3·39	4·19	+ ·80	124	·45	30	23

SUPPLEMENTARY RAINFALL, SEPTEMBER, 1919.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches
II.	Sevenoaks, Speldhurst Close.	1·37	XI.	Lligwy	3·72
,,	Ramsgate	·90	,,	Douglas, Isle of Man	...
,,	Hailsham	1·16	XII.	Stoneykirk, Ardwell House...	2·84
,,	Totland Bay, Aston House...	1·44	,,	Carsphairn, Shiel	5·70
,,	Stockbridge, Ashley..	2·45	,,	Langholm, Drove Road	6·11
,,	Grayshott	1·62	XIII.	Selkirk, The Hangingshaw..	1·97
,,	Upton Nervet	3·24	,,	North Berwick Reservoir	2·57
III.	Harrow Weald, Hill House...	1·36	,,	Edinburgh, Royal Observaty.	2·23
,,	Pitsford, Sedgebrook	1·41	XIV.	Biggar	3·31
,,	Woburn, Milton Bryant	2·19	,,	Maybole, Knockdon Farm ...	4·42
,,	Chatteris, The Priory	1·72	XV.	Shiskine	3·77
IV.	Elsenham, Gaunts End	1·09	,,	Ardgour House	12·55
,,	Rayleigh	·55	,,	Oban	5·57
,,	Colchester, Hill Ho., Lexden	·71	,,	Holy Loch, Ardnadam	6·44
,,	Aylsham, Rippon Hall	·95	,,	Loch Venachar	4·60
,,	Swaffham	1·00	XVI.	Glenquey	6·50
V.	Bishops Cannings	1·83	,,	Loch Rannoch, Dall	3·10
,,	Weymouth	1·31	,,	Blair Atholl	...
,,	Ashburton, Druid House	3·07	,,	Coupar Angus	·96
,,	Cullompton	...	,,	Montrose, Sunnyside Asylum.	1·27
,,	Lynmouth, Rock House	2·08	XVII.	Balmoral	3·50
,,	Okehampton, Oaklands	...	,,	Fyvie Castle	5·57
,,	Hartland Abbey	1·57	,,	Keith Station	4·40
,,	St. Austell, Trevarna	2·84	XVIII.	Rothiemurchus	...
,,	North Cadbury Rectory	1·62	,,	Loch Quoich, Loan	...
VI.	Clifton, Stoke Bishop	1·61	,,	Skye, Dunvegan	8·59
,,	Ledbury, Underdown	1·30	,,	Fortrose	2·40
,,	Shifnal, Hatton Grange	1·72	,,	Glencarron Lodge	9·53
,,	Droitwich	1·60	XIX.	Tongue Manse	4·77
,,	Blockley, Upton Wold	1·80	,,	Melvich	2·67
VII.	Grantham, Saltersford	1·78	,,	Loch More, Achfary	9·41
,,	Louth, Westgate	1·93	XX.	Dunmanway, The Rectory	3·63
,,	Bawtry, Hesley Hall	1·52	,,	Mitchelstown Castle	2·31
,,	Derby, Midland Railway	1·60	,,	Gearahameen	7·50
VIII.	Nantwich, Dorfold Hall	2·45	,,	Darrynane Abbey	3·20
,,	Bolton, Queen's Park	2·22	,,	Clonmel, Bruce Villa	2·03
,,	Lancaster, Strathspey	2·59	,,	Roscrea, Timoney Park	2·00
IX.	Langsett Moor, Up. Midhope	...	,,	Broadford, Hurdlestown	4·19
,,	West Witton	·90	XXI.	Enniscorthy, Ballyhyland...	2·69
,,	Scarborough, Scalby	1·46	,,	Rathnew, Clonmannon	2·50
,,	Ingleby Greenhow	...	,,	Hacketstown Rectory	3·17
,,	Mickleton	2·20	,,	Ballycumber, Moorock Lodge	2·21
X.	Bellingham, High Green Manor	2·22	,,	Balbriggan, Ardgillan	1·99
,,	Ilderton, Lilburn Cottage	1·30	,,	Castle Forbes Gardens	3·49
,,	Keswick, The Bank	4·68	XXII.	Ballynahinch Castle	5·96
,,	Orton	3·70	,,	Woodlawn	4·43
XI.	Llanfrechfa Grange	2·33	,,	Westport House	3·94
,,	Treherbert, Tyn-y-waun	4·90	,,	Dugort, Slievemore Hotel	...
,,	Carmarthen, The Friary	2·53	XXIII.	Enniskillen, Portora	4·01
,,	Fishguard, Goodwick Station.	2·43	,,	Dartrey [Cootehill]	3·42
,,	Crickhowell, Tal-y-maes	2·00	,,	Warrenpoint, Manor House	2·62
,,	Birmingham WW., Tyrmynydd	2·66	,,	Belfast, Cave Hill Road	4·01
,,	Lake Vyrnwy	2·70	,,	Glenarm Castle	3·18
,,	Llangynhafal, Plas Drâw	2·46	,,	Londonderry, Creggan Res...	3·37
,,	Rhiwbryfdir	10·01	,,	Milford Manse	3·38
,,	Dolgelly, Bryntirion	6·94	,,	Killybegs	6·44

Climatological Table for the British Empire, April, 1919.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	71·0	19	27·4	3	55·1	38·1	39·6	80	119·7	25·7	3·93	18	7·3
Malta	84·2	5	51·0	27	65·9	55·4	...	82	135·0	...	·84	3	5·0
Lagos	99·0	9	72·0	9	88·1	78·4	75·1	76	158·0	63·0	3·96	11	4·9
Cape Town	94·9	18	50·1	20	73·5	57·6	57·1	77	...	...	1·71	8	3·8
Johannesburg	82·0	1	40·1	22	72·6	51·4	48·8	70	...	41·8	1·73	8	2·8
Mauritius	84·4	6	62·2	16	81·3	71·0	67·3	76	...	56·5	2·96	26	6·3
Bloemfontein	84·7	14	42·2	22	76·9	50·9	50·6	66	..	...	1·28	9	2·3
Calcutta...	103·0	13	66·6	9	96·1	75·3	71·0	67	...	63·1	4·02	4	3·5
Bombay	91·5	27	74·5	5	89·0	76·9	73·2	75	132·3	68·0	·00	0	1·3
Madras	98·3	23	73·7	5	93·6	78·7	75·0	75	163·6	71·3	·00	0	2·7
Colombo, Ceylon ...	91·8	3	71·5	11	89·8	76·3	75·2	80	157·9	70·6	5·96	16	6·9
Hongkong	85·9	30	56·8	1	77·1	69·2	68·2	85	...	...	4·43	14	7·9
Sydney	87·9	27	52·3	13	74·7	58·5	57·1	74	137·9	44·5	3·20	15	5·1
Melbourne	83·5	25	40·9	28	72·2	50·6	49·8	65	13 ·2	34·4	·74	8	4·9
Adelaide	93·4	4	47·2	11	78·8	58·1	51·3	53	150·0	37·6	·27	4	5·2
Perth	87·7	10	50·4	17	74·6	58·0	55·7	64	153·4	44·6	·55	4	4·4
Coolgardie	87·8	15	46·8	18	76·5	53·7	48·8	53	149·8	42·8	4·15	7	3·6
Hobart, Tasmania ..	76·7	5	39·5	1	65·5	49·5	46·6	65	123·0	30 6	1·09	9	6·6
Wellington	67·5	2	38·2	16	60·7	49·7	47·8	76	143·0	26·6	1·93	12	6·5
Jamaica, Kingston ..	91·7	13	68·1	26	87·8	72·3	69·6	77	...	...	2·40	5	4·7
Grenada	89·0	8*	73·0	20†	86·0	75·0	...	72	137·0	...	·85	10	4·2
Toronto	62·8	20	9·9	1	50·9	34·3	31·3	69	128·2	8·0	2·89	15	6·5
Fredericton	65·0	28	19·0	2,4,5	49·0	30·4	30·9	71	...	...	2·95	12	6·7
St. John, N.B. ...	52·5	24	20·5	2	44·2	32·2	31·2	77	122·1	20·0	4·37	15	7·4
Victoria, B.C.	67·2	23	36·8	8	55·5	42·4	41·0	79	133·0	26·8	2·90	14	5·8
Bombay Jan. ...	86·7	7	61·1	13	82·7	68·8	64·0	69	133·0	52·6	·11	1	1·5
Bombay Feb. ...	85·1	9	64·0	19	82·6	68·6	64·7	71	130·0	55·3	·00	0	1·1
Bombay March ...	91·0	28	70·7	5	85·1	72·9	69·6	75	129·4	63·0	·00	0	1·1

*12 and 29. † and 22.

Johannesburg.—Bright sunshine 267·2 hours.

Bloemfontein.—The warmest April ever recorded.

COLOMBO, CEYLON.—Mean temp. 83°·0, or 0°·4 above, dew point 0°·5 above, and R 1·11 in. below, averages. Mean hourly velocity of wind 4·0 miles. TSS on 3 days.

HONGKONG.—Mean temp. 72°·5. Bright sunshine, 154·2 hours. Mean hourly velocity of wind 12·5 miles.

Melbourne.—Mean temp. 1°·9 above, and R 1·53 in. below, averages.

Adelaide.—Mean temp. 4°·6 above the average, with two exceptions highest for April in 62 years.

Perth.—R 1·06 in. above average.

Coolgardie.—R about 3 inches above average.

Wellington.—Mean temp. 1°·7 below, and R 2·06 in. below, averages. Bright sunshine, 147·5 hours. Frost on 9 mornings.